6.0 Terminology

Algorithm A step-by-step procedure for computing a solution to a mathematical problem.

All-or-nothing assignment Allocation of the total number of trips between two zones to a single path, usually on the basis of the minimum travel time.

Auto ownership The number of passenger vehicles available to a household for routine daily travel. Because an individual's choice of transportation mode depends strongly on vehicle availability, average vehicle availabilities for households with similar income characteristics are considered a basic zonal descriptor.

Bottleneck The point of minimum capacity along a highway segment.

BPR The U.S. Bureau of Public Roads, now FHWA.

BPR Equation A formula suggested by the BPR for calculating travel time as a function of volume on a highway link.

Caltrans California Department of Transportation.

Capacity constrained A traffic assignment procedure that places trips on multiple origin-to-destination paths, taking into account the effects of congestion.

CARB The California Air Resources Board.

CCCTA Central Contra Costa Transit Authority.

Choice set the set of alternatives from which a consumer may choose.

CMP Congestion Management Plan.

Congestion Interference of vehicles with one another as they travel, reducing speed and increasing travel time. Travel time on a link increases as an exponential function of the ratio of the number of cars on the link (volume) to the link's capacity. At low volumes, links are said to be uncongested, since vehicles do not interact much; as volumes approach capacity (defined as the maximum flow rate at the most constructed point on a link), congestion effects become increasingly apparent and travel time increases noticeably. The volume of entering vehicles may exceed the capacity of the link, in which case the

	excess vehicles form a queue within the link, link traversal times increase exponentially, and flow exits the link at capacity rates.
CTPS	The Central Transportation Planning Staff of the Massachusetts Executive Office of Transportation and Construction. CTPS performs the analytical functions of the MPO for metropolitan Boston.
Delay	The difference between the actual time spent traversing a link and the free-flow (unimpeded) time.
Destination	The zone in which any trip terminates.
Destination choice	Given that a trip will be made, the purpose of the trip, and the trip's origin (see trip generation), the destination choice process simulates an individual's choice of the location at which the activity associated with the trip's purpose will be carried out. This generally refers to a method for performing the trip distribution function.
Deterministic	Not stochastic.
Disaggregate models	In common usage, models developed to represent the behavior of individual decision-makers (persons, households, firms).
Discrete choice	A modeling approach depicting choice among readily definable and distinct alternatives.
DOT	The United States Department of Transportation.
EMME/2	A computer software package for transportation network and travel demand analysis.
EPA	The United States Environmental Protection Agency.
Equilibrium	Any complex system that has attained its highest entropy steady-state operating condition is said to be in equilibrium. The traffic assignment process has reached equilibrium when a change of route by any traveler would increase travel time, for the individual traveler if trips are assigned using the user-optimal decision rule, or the total time for all travelers if the system-optimal principle is used.
Expert system	A modeling approach that incorporates human judgment and expertise, both quantitative and qualitative, in a decision-oriented framework.

Feedback Using the results of one step in the modeling process to recalculate a previous step. For example, the link volumes from traffic assignment can (and should) be used to recalculate first travel speeds and then trip distribution, since the first pass through trip distribution employs only an approximation of link speeds.

FHWA The United States Department of Transportation, Federal Highway Administration.

Fratar method A method used extrapolating trip distribution on the basis of growth factors for both the origin and the destination, named after its developer.

FREQ Freeway Queuing model (A.D. May).

FTA The United States Department of Transportation, Federal Transit Administration (formerly UMTA).

Functional classification The classification of urban roadways by function. Roadways at the top of the hierarchy serve intercity and other long-distance movement of traffic, roadways at the bottom provide access to land.

Generalized price A numerical expression capturing both the time costs and the dollar costs affecting travel behavior.

Gravity model A trip distribution model which represents trip exchanges as a product of attractions and productions divided by an exponential function of travel costs (usually measured only by travel times).

HBW Home-Based Work.

HCM Highway Capacity Manual.

Home-based Starting and/or ending at home.

Home-based work A trip with one end at work and the other at home.

Household travel survey A survey seeking to determine the travel habits of a household, and characteristics of the household which are relevant to its travel behavior, such as auto ownership, number of occupants, income, etc. The survey usually consists of a questionnaire and a "travel diary" which asks each member of the household to record trips taken during the survey period (usually a day). Recently, "activity" surveys have been performed.

HOV High-occupancy vehicle.

HPMS Highway Performance Monitoring System, a federally-mandated database consisting of a representative sample of highway links.

Induced demand Travel demand alleged to result from added transportation capacity or reduced transportation price.

Interzonal Between two different zones.

Intrazonal Within a single zone.

ISTEA The Intermodal Surface Transportation Efficiency Act of 1991.

ITS Intelligent Transportation Systems.

K-factors Adjustment factors applied to trip distribution models representing, in theory, social, economic, and geographic conditions that affect travel patterns but are not included in the model specification. In practice, K-factors are simply added to improve the fit of trip distribution models to observed data.

Latent demand Travel demand said to be suppressed by lack of capacity, high price, etc., which will materialize if such impediments are removed.

Level of service In general, a set of metrics or qualitative descriptors of a transportation system's performance. Matrices of interzonal travel times and costs are sometimes called "level of service tables"; the Highway Capacity Manual (NCHRP, 1985) defines levels of service for intersection and highway operations, with ratings that range from A (best) to F (worst).

Link An element of a transportation network, a representation of a guideway segment, terminating in a node at either end. A link may have a number of attributes, including distance, number of lanes, capacity, and directionality, and is often assigned a function which relates travel time on the link to the volume of traffic using the link.

Logit A choice model formulation based on the principle that individuals maximize utility in choosing among available alternatives. The logit formulation involves specifying a utility function for each individual, with a deterministic component (that is, one which depends on characteristics of the individual and of the alternatives) and a stochastic disturbance (or error term).

LOS Level of Service.

Macroscopic model A model that describes traffic flow in the aggregate.

Matrix A multi-dimensional table of numbers.

Microscopic model A model that describes traffic flow in terms of individual vehicles.

Microsimulation A demand simulation focusing on the behavior of individuals and households.

MinUTP A transportation demand modeling package.

Mode choice A process by which an individual selects a transportation mode for use on a trip or trip chain, given the trip's purpose, origin, and destination; characteristics of the individual; and characteristics of travel by the realistically-available modes. Mode choice is placed either before or after trip distribution in a conventional modeling sequence. Some model systems determine mode choice jointly with destination choice for some trip purposes. Multinomial logit is the formulation used for mode choice in the vast majority of cases.

Mode split The percentage, or share, of trips captured by the various transportation modes.

MPO The Metropolitan Planning Organization designated by the state to carry out various federal urban transportation planning mandates.

MTC The Metropolitan Transportation Commission, MPO for the nine-county San Francisco Bay Area.

Multinomial logit A logit model of choice among more than two alternatives. A logit model for choosing between two alternatives is "binary logit".

NARC The National Association of Regional Councils, a Washington-based voluntary association of MPOs and other regional planning organizations.

NCHRP National Cooperative Highway Research Program.

Nested logit Hierarchical application of the logit formulation. Nested logit is used for choices in which some alternatives are more similar than others (e.g., 2-person carpools and 3-person carpools appear to be more alike than either is to public transit). In these cases, the assumption of full independence in the utility error terms cannot be justified. Conceptually, nested logit analysis involves the grouping of similar alternatives into one or more "secondary" logit models, with a "primary" choice among the bundles of similar alternatives.

Network A mathematical representation of an area's transportation (or communication) facilities, composed of links and nodes.

NHB Non-Home Based.

Node A point where two links join in a network, usually representing a decision point for route choice but sometimes indicating only a change in some important link attribute.

Non-Home Based A trip which neither begins nor ends at home.

Off-peak Occurring during periods of relatively low traffic, not during a peak.

Origin The location or zone at which a trip begins; the place where a trip is "produced". (See also trip generation, trip production, trip distribution.)

Path A route through a network; a series of links and nodes connecting an origin and a destination.

Peak Whether categorized by purpose or by geographic area, trips occur at different rates at different times of the day. A graph of trips by time of day typically reveals one or more peaks. These peaks play a key role in conventional travel demand analysis, which focuses on maximum infrastructure needs in each corridor. The dominant weekday peaks are in the morning ("AM Peak") and the late afternoon ("PM Peak"), obviously related to the timing of work trips. A peak can be characterized by its maximum trip rate (in trips per unit time) or by a duration over which some threshold trip rate is maintained. The portions of the peak before and after the peak hour are called the "shoulders of the peak."

Peak hour The hour during which the maximum traffic occurs. The peak hour during which traffic is highest varies from link to link and place to place, a fact which is not fully reflected in traditional travel demand analysis.

Peaking factor The ratio of vehicle trips made in a peak period to vehicle trips in some given base period, usually a day.

Peak-hour factor 1) The ratio of traffic volume in the peak period to Average Daily Traffic, 2) In critical movement analysis, a measure of peaking characteristics within the peak hour, usually calculated as the ratio of traffic volume in the peak hour to the traffic volume in the 15 minutes with the highest volume. Intervals shorter than 15 minutes are sometimes used, depending on the purpose of the analysis.

Peak Spreading Lengthening of the peak period, usually accompanied by a flattening of the peak.

Person trip The movement of a person form an origin to a destination, as opposed to the vehicle trip associated with the same origin-to-destination movement. A carpool carrying three people from origin-to-destination has made one vehicle trip, its occupants together have made three person trips.

Regression A mathematical technique for exploring relationships between sets of observations on two or more variables. A functional relationship between the variables is postulated, and line or curve fit between the plotted observations so as to minimize some function (usually the square) of the deviations between the plotted points and the line or curve. The result is the equation of the best-fit line or curve describing the dependent variable in terms of the other variables, which is often used for predictive purposes; and measures of how goodness-of fit. If the postulated relationship is a line, the technique is called linear regression.

Revealed preference A preference which is identified through analysis of actual choices and the conditions under which they were made.

Ridesharing Providing multiple person trips per vehicle trip. Ridesharing modes include carpools, vanpools, taxis (sometimes), shuttles, jitneys, dial-a-ride, etc. Bus and rail transit are technically forms of ridesharing although they are generally treated as a separate mode.

RMSE Root Mean Square Error.

Route choice	The process of simulating the sequence of roadways an individual will choose for a trip, given the trip's origin and destination, and mode. Route choice is generally the task of the traffic assignment phase in the model sequence, and is based on the assumption that an individual will choose the route that will minimize travel time (or cost) for that trip. For mass transportation, route choice is usually straightforward for all but the largest systems, and does not require equilibrated traffic assignment procedures.
RTIP	Regional Transportation Improvement Program, a compilation of projects to improve a region's transportation system, designed to be implemented in the short-to-medium term.
RTP	Regional Transportation Plan, the long-range plan for investing in transportation facilities in a region.
SACOG	Sacramento Area Council of Governments.
Sample enumeration	A method of microsimulation based on calculations made for each individual observation which are later aggregated to represent the full sample or population.
SCAG	Southern California Association of Governments.
SCAQMD	South Coast Air Quality Management District.
SIP	A State Implementation Plan developed under the Federal Clean Air Act to improve air quality.
Sketch planning	Simple, approximate methods of analysis used to provide initial estimates of impact or to "screen" projects for which more detailed analysis would be worthwhile.
SOV	Single Occupant Vehicle.
Stated preference	A preference which is stated by the consumer when offered several hypotentical choices and a description of the conditions under which they would be made available.
Stochastic	Characterized by randomness; having a random component.
Supply	The character of the transportation system that determines its operating performance.
TAZ	Traffic Analysis Zone.
TCM	A Transportation Control Measure for emissions reduction.

TDM Travel Demand Management.

TIP The regional Transportation Improvement Program, a Federally-required MPO listing of pending highway and transit projects.

TODF Time of Day Factor.

Traffic assignment A process by which trips, or flows among zones, are allocated to feasible routes (paths) through a network.

Tranplan A software system for transportation modeling.

TRB Transportation Research Board.

Trip attraction The process of attracting trips to a zone. A trip terminating or originating in a zone whose existence is due to an activity carried out in the zone is said to be "attracted". Trip attraction is generally a function of the land uses in a zone.

Trip chaining The traveler's process of linking trips into tours. A trip chain, or tour is defined such that the destination of the first trip is the origin of the second, the destination of the second trip is the origin of the third, and so forth.

Trip distribution The process of determining trip exchanges, that is, the number of trips between each pair of zones. Trip generation results - trip origins and destinations, or trip productions and attractions, depending on the methodology in use - are input to the trip distribution process, the outputs of which are trip tables (matrices) with each cell containing the number of trips between a pair of zones. The most common trip distribution analysis technique is the gravity model, although intervening opportunities and logit formulations are also common.

Trip frequency The number of trips per unit time.

Trip generation The process of determining the number of trip origins and destinations associated with a given set of activities in a given area, usually by applying trip rates (or a cross-classification or regression model) to a land use inventory or projection. In a regional travel demand study, trip generation is done at the zone level and requires detailed descriptions or projections of land use for each zone. For a traffic impact analysis, it is done at the project level and requires a tabulation of the square footage devoted to each activity the project accommodates. The outputs of trip generation analysis are one-dimensional arrays of origins and destinations for each zone which become the input of trip distribution analysis.

Trip production The process of producing trips from a zone. A trip originating or terminating in a zone whose existence is due to the traveler's residence in the zone is said to be "produced" there (the terminology is less clear for non-home-based trips). Trip production is generally a function of the residential lane uses in a zone.

Trip purpose A classification of trips by their preceding and/or following activities ("purposes"). For computational reasons, conventional travel demand models typically employ a small number of trip purposes such as "home-work", "home-shop", "home-other", and "non-home-based". (A category such as "home-work" usually comprises both home-work and work-home trips.)

Trip rate For a given type of land use or geographic area, the number of trips per unit time per unit size. The Institute of Transportation Engineers maintains a widely-used catalog of average trip rates for a large number of land use types. Trip rates are estimated via any of a number of techniques, including cross-classification, linear regression, and multiple regression.

Trip table A table, or matrix, showing the number of trips made from every zone in a network to every other zone, in a given time period, and for a given trip purpose or set of purposes. Trip tables are the product of the trip distribution phases of the travel demand process.

Utility In transportation modeling, the value (positive or negative) of a particular option, usually estimated as a function of the travel option's characteristics as well as traveler or population characteristics.

UTPS The Urban Transportation Planning System, a transportation modeling package developed in the 1970s by the U.S. Department of Transportation for use on mainframe computers. While UTPS continues in use by a number of large MPOs, it is no longer officially maintained.

Vehicle trip An origin-to-destination journey by a single vehicle, as opposed to a person trip, the origin-to-destination journey of an occupant of the vehicle. A bus carrying 40 people from an origin to a destination makes one vehicle trip, while its occupants make a total of 40 person trips.

VMT Vehicle-miles traveled.

Volume-delay function A functional relation between the volume and the speed of travel on a facility.

Zone

The basic geographical unit for conventional travel demand analysis. A study area is divided into zones, the number and size of which depend on the size and land use patterns of the area, the geometry of the roadway network, the nature of the problem, the computing resources available, census boundaries, and political boundaries. Zone boundaries are defined so that land uses and activities within are homogenous, to the extent practicable.